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THE STATUS OF FONTARIA CORIACEA KOCH AND OF POLYDESMUS CORRUGATUS WOOD: A MOST REGRETTABLE TANGLE OF NAMES IN THE DIPLOPODA (POLYDESMIDA: XYSTODESMIDAE)

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It has been stated that, next to infallibility, an author's most prized gift is to be able to discover and rectify his own mistakes, as this somewhat ameliorates the situation in the eyes of the culprit, if no one else. Inasmuch as I became guilty, some years ago, of compounding one of the most egregious errors yet committed in the study of American diplopods, I am very grateful to have the opportunity of disclosing and uprooting this particular weed in the field of milliped nomenclature.

More than a century ago (1847) the celebrated student of arachnids and myriapods C. L. Koch described nearly a dozen species of millipeds from North America, including three referred to the genus *Fontaria*. One of these was identified with the earlier *Fontaria virginiensis* (Drury), the other two, *F. coriacea* from Virginia and *F. oblonga* from Pennsylvania, being described as new. Subsequently Koch compiled the material from his 1847 work, the "System der Myriapoden," into a sumptuous volume published in 1863 under the title "Die Myriapoden, getrau nach der Natur abgebildet und beschrieben." This work is largely a reprint of the earlier one, with the omission of classification, and with enlarged and improved illustrations and a few additional species.

Curiously enough, however, the work of Koch was unknown to Horatio C. Wood, the first prominent American student of the Diplopoda. In 1864 Wood himself named several species in *Fontaria* (which he considered a subgenus of *Polydesmus*), namely, *bifidus, crassicutis, corrugatus,* and *trimaculatus*. A year later, these were all redescribed and illustrated, along with what Wood considered to be *virginiensis,* in his classic monograph of the myriapods of North America.

The species of *Fontaria* named by Koch and Wood coexisted peacefully in the literature for more than twenty years, until they engaged

the attention of Charles H. Bollman. This worker, in attempting to work out the correct identifications of the Kochian species, unwittingly created a confusion of names which has persisted for more than 70 years!

Bollman's first reference to Koch's *Fontaria* species appeared in 1889, in a catalog of the myriapods of Indiana. Under the name *Fontaria coriacea,* he listed Wood's name *corrugatus* as a synonym, and stated that "A comparison of specimens of *corrugata* Wood with Koch's figures and descriptions shows that they are the same. Koch's figures show a broad yellow band along the posterior margin of each segment. This is a character common to the eastern specimens, but rare in the western forms." In the same paper, under the diagnosis of his new species *Fontaria butleriana,* Bollman wrote "It approaches very closely to Koch's figures of *F. virginiensis,* and it is probable that he has described this species as *virginiensis.*"

Bollman's catalog of the North American myriapods, posthumously published in 1893 (U. S. Nat. Mus. Bull. 46), again placed *corrugatus* in the synonymy of *coriacea,* and listed *oblonga* as a valid form, but did not mention the name *virginiensis, sensu* Koch. In the same volume, however, appeared a short paper entitled "Notes upon the North American Myriapods described by C. L. Koch" in which Bollman discussed all three of the *Fontaria* names.

For *virginiensis* we have the following comments: "The specimens Koch has referred to the *Julus virginiensis* of Drury do not belong to that species, but seem to be very close, if not identical, with *Fontaria butleriana* Bollman from Indiana. His figures represent a distinct narrow yellow band along the posterior margin of the segments as in the latter species."

Bollman then disposed of *coriacea* as follows: "A valid species of which *Polydesmus corrugatus* Wood is a synonym. His specimens have a yellow band along the posterior margin of the segments as is the case in the eastern specimens of *coriacea.*"[1]

Koch's *F. oblonga* was regarded as "A valid species belonging to the same group as *castanea, tennesseensis,* and *pulchra,* and perhaps closely allied to the latter, from which it is separated by the superior position of the repugnatorial pore. Koch's specimens, as indicated by the color, were probably not full grown."

These remarks so influenced subsequent workers that no one has ever seriously challenged Bollman's views. However, from time to time various misidentifications of "*coriacea*" appeared in the literature, and upon becoming interested in the genus *Apheloria,* into which *coriacea* had been subsequently placed, I felt constrained to publish a redescription of what, on Bollman's authority, appeared to be Koch's *coriacea.* Not at the time, possessing *Die Myriapoden,* I made a somewhat hurried examination of a copy at the U. S. National Museum, when it was noted that the three American species of *Fontaria* were all figured on

[1]This reiterated statement is very perplexing. It is difficult to imagine what Bollman had at hand to represent "eastern specimens of *coriacea*" for I have never seen any *Apheloria* material so colored. It seems possible that he actually had no material, and relied upon Wood's notes and illustration of *corrugatus,* which in turn were made from preserved and possibly discolored specimens. What then, is the identity of Bollman's Indiana "*coriacea*" which, by implication of the earlier statement, rarely have a broad yellow transverse band across each tergite? I have so far not located this part of the Bollman Collection at the U. S. National Museum.

the same plate (XXXII) as figures 62-64, and that one of them corresponded closely to what I had come to recognize, from museum specimens and literature accounts, as *Apheloria coriacea.* Subsequently the order of the illustrations and the names became reversed in my mind, and the synonymy proposed by Bollman thereupon seemed to be entirely correct. In 1949 I became his accomplice by publishing a redescription and designating neotypes of *"coriacea"* from eastern Virginia. This was a blunder of no mean proportions, and to those who have followed the matter this far, I can only address the pretext attributed to the late Thomas Barbour, "I was very young when I wrote that paper."

Since that time several events again focussed attention upon the status of *coriacea.* A copy of *Die Myriapoden* was obtained and studied at length; several hundred specimens of *Apheloria* in full color were examined; and, most important, type material of *Polydesmus corrugatus* became available. In the U. S. National Museum are four specimens labeled—probably by O. F. Cook—as types of *corrugatus,* and, if there be any doubt about their status, there are topotypes in the Museum of Comparative Zoology which are identical with the ostensible types.

Let us start at the beginning and examine Koch's accounts and illustrations in *Die Myriapoden.* Figure 62, on Plate XXXII, depicts a large robust xystodesmid about 35 mm long, dorsally brownish-black with red or pink paranota and a narrow yellow stripe on the caudal edge of each tergite. This illustration is of *Fontaria virginiensis* (as identified by Koch) but the animal is clearly what I described in 1949 as *coriacea* and what has been going by that name ever since 1893. The identification on the basis of form and color is corroborated by the text comment which states that "Die Oeffnung der weiblichen [*sic*] Genitalien gross und oval, die Genitalien mit einer langen Zange, die Zangetheile pfriemenförmig und gleich einem Pfropfenzieher gewunden." The phrase "coiled like a corkscrew" is quite a good chracaterization of the male gonopod of an *Apheloria!*

On the other hand, the figure of *F. coriacea* (fig. 63) shows a smaller species, in which the dorsum is blackish, and ornamented with very broad yellowish bands which appear to occupy most of the metatergites and expand laterally upon the paranota. This coloration does not correspond to that of any species of *Apheloria* known to me, nor to any xystodesmid occurring in the Atlantic Coast region except that which I named some years ago as *Zinaria rubrilata,* so named because of the very wide chestnut colored stripes across the tergites. Unfortunately, Koch's description must have been made from a female specimen, for he made no mention whatever of "Genitalien." It seems premature to identify the name *coriacea* with one of our established species at this time, but there can be no doubt that the name is *not* a senior synonym of *corrugatus* Wood or of any other known form of *Apheloria.* Probably it might best be placed on the list of *nomina dubia* for the time being. It is a matter of regret that the location of Koch's myriapod material is unknown. My colleagues C. A. W. Jeekel and Otto Kraus have been unable to locate any definite information on the matter.

As the matter now stands, *Fontaria virginiensis* Koch 1847 (*nec* Drury 1770) seems clearly to be the oldest name definitely based upon a species of *Apheloria.* Yet, as it is preoccupied, it falls as a junior

objective homonym of *Fontaria virginiensis* (Drury), a combination which dates from the use of J. E. Gray in 1832. Since *Fontaria coriacea* Koch is here considered to be not a species of *Apheloria*, it follows that the first valid name based upon a member of that genus is Wood's *corrugatus*, erected in 1864 for the large, widespread species of eastern United States ornamented with reddish paranota and yellow crossbands. The combination *Apheloria corrugata* has in fact already been established by Count von Attems (1938, Das Tierreich, 69:170), although Attems did not explain his usage. Perhaps his line of reasoning paralleled mine as outlined above.

Although I am unable to understand Bollman's statement that the broad yellow bands shown for *coriacea* are ". . . common to the eastern specimens but rare in the western forms . . .," I am in complete accord with his comment that *Fontaria butleriana* approaches very closely to Koch's figures of *F. virginiensis*. I have seen the types of *butleriana* in the National Museum, and regard them as representative of a midwestern subspecies of *corrugata* in which the red pigment of the paranota is replaced by yellow which occupies a smaller portion of the surface than in the nominate form.

The correct name and skeleton synonymy for the typical subspecies of northeastern United States is as follows:

Apheloria corrugata corrugata (Wood)[2]

Fontaria virginiensis (nec Drury 1797) Koch, 1847, Syst. der Myriapoden, p. 141; 1863, Die Myriapoden, p. 71, pl. 32, fig. 62 (type locality: North America).

Polydesmus corrugatus Wood, 1864, Proc. Acad. Nat. Sci. Philadelphia, vol. 6, p. 6; 1865, Trans. American Philos. Soc., vol. 13, p. 222, fig. 50, 51.

Fontaria coriacea (nec Koch 1847) Bollman, 1889, Proc. U. S. Nat. Mus., vol. 11, p. 406; 1893, Bull. U. S. Nat. Mus., No. 46, p. 123, 152.

Apheloria coriacea Loomis, 1939, Bull. Mus. Comp. Zool., vol. 86, p. 193; Hoffman, 1949, Amer. Mus. Nov., No. 1405, pp. 1-8, figs. 1-4.

Apheloria corrugata Attems, 1938, Das Tierreich, lief. 69, p. 170.

Apheloria adela Chamberlin, 1939, Bull. Univ. Utah, biol. ser., vol. 5, No. 3, p. 10, fig. 34 (type locality: Ithaca, New York); Hoffman, 1949, Proc. U. S. Nat. Mus., vol. 99, p. 372; Causey, 1955, Proc. Biol. Soc. Washington, vol. 68, p. 25.

Type specimens.—Four specimens (U.S.N.M. No. 2303) labeled "types" are probably part of the Wood Collection which is largely at the Academy of Natural Sciences of Philadelphia. Several other millipeds, indicated as Wood's types, have recently been discovered at Washington, and it is known that Cook had borrowed parts of the Academy's milliped collection in the 1890's. In the original description Wood cited "Michigan" and Trenton Falls, New York, as localities for the species, and of these two the latter is selected for the type locality since it is unlikely that the typical subspecies as conceived on the basis of the type material extends as far west as Michigan.

Diagnosis.—*A. corrugata* belongs in the typical section of the genus

[2]*Fontaria butleriana* Bollman 1889 and *Apheloria virginia* Chamberlain 1939 are regarded as recognizable subspecies, occurring respectively in the Ohio-Indiana-Kentucky region and in south central Virginia.

with *montana* (Bollman), the generotype, the two having almost identical gonopods. The coloration, however, is very characteristic, there being no other American xystodesmid known to me in which the paranota are brilliantly reddish-pink with a narrow lemon yellow strip on the caudal margin of the tergites. This color pattern is stable over the entire Appalachian region from New England to southern Virginia, but at the southwest and western edges of the range *corrugata* modifies its coloration into the patterns which represent the subspecies *butleriana* and *virginia*.

Synonymy.—The status of *virginiensis* Koch has already been discussed. I have seen a considerable number of living and preserved specimens from Ithaca, New York, the type locality of *A. adela*, and can find no characters of structure or coloration by which that local population differs from the rest of the population at large. The Virginia specimens which I tentatively referred to *adela* in 1949 have since been found to be intergrades between *corrugata* and *butleriana*, and I presume this to be the status of the material recorded from West Virginia by Causey (1955) as *adela*. These specimens are usually smaller than typical *corrugata*, and the red color of the paranota is greatly reduced and partly replaced with yellow. This sort of milliped is found in the Appalachian Plateau region from southwestern Virginia north to western Pennsylvania. Further to the west it merges into the all-yellow ornamentation of *A. c. butleriana*.

Distribution.—From southern Virginia (Nansemond, Surry, Campbell, and Bland counties) north through the Appalachians and Coastal Plain at least to the upper Adirondack region and adjacent parts of New England. The northern limits of the range are still poorly known.

Summary

C. H. Bollman (1889) established the synonymy of *Fontaria coriacea* Koch 1847 and *Polydesmus* (*Fontaria*) *corrugatus* Wood 1864, an association which has been accepted by virtually all subsequent workers.

However, it seems apparent, on the basis of material determined as *corrugatus* by direct comparison with the original types of Wood, that those two names are *not* synonyms. Bollman did not mention the locality of the specimens which he regarded as *corrugatus* and which were said to match Koch's figure of *coriacea;* and I have never seen any material of *Apheloria* which does.

The species described by Koch under the name *Fontaria virginiensis* is not conspecific with *Fontaria virginiensis* (Drury), thereby becoming a junior primary homonym, but it is conspecific with that described by Wood as *corrugatus* and identified by Bollman as *coriacea*.

Fontaria coriacea Koch is herewith considered unidentifiable at the present; it is certainly not a species of *Fontaria* Gray (generotype: *Julus virginiensis* Drury) in the strict sense, nor of *Apheloria* Chamberlin (generotype: *Fontaria montana* Bollman).

Therefore, *Polydesmus corrugatus* is resurrected from its unwarranted relegation to synonymy, and restored as the correct name for the most abundant and widespread species of *Apheloria* in eastern North America.